

Claims

1. An apparatus for the electrodialytic regeneration of an electroless bath electrolyte comprising:

a first electrodialysis unit and a second electrodialysis unit, each unit having diluate compartments through which the bath electrolyte is channeled, and concentrate compartments through which a regeneration electrolyte is channeled;

two or more electrodes, comprising anode and cathode, in joint operation with the electrodialysis units;

wherein in the first electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent cations and on an anode side by membranes that are selectively permeable to all anions;

wherein in the second electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent anions and on an anode side by membranes that are selectively permeable to all cations;

wherein the diluate compartments of the first electrodialysis unit are serially connected to the diluate compartments of the second electrodialysis unit via first lines through which the bath electrolyte is sequentially channeled;

wherein the concentrate compartments of the first electrodialysis unit are serially connected to the concentrate compartments of the second electrodialysis unit via second lines through which the regeneration electrolyte is sequentially channeled;

wherein the electrodes are in electrode compartments which are separated from adjacent compartments by membranes and through which electrode compartments a rinsing electrolyte can flow via third lines; and

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wherein one of said electrode compartments adjacent to the compartments of both electrodialysis units houses an electrode which is shared by both the first and second electrodialysis units.

2. The apparatus of claim 1 wherein the electrode that is shared by both electrodialysis units is an anode.

3. The apparatus of claim 1 wherein the electrode compartments contain a rinsing electrolyte which is an aqueous solution of a rinsing compound selected from  $\text{Na}_2\text{SO}_4$ ,  $\text{K}_2\text{SO}_4$ ,  $\text{Na}_2\text{PO}_3$ , , and mixtures thereof.

4. The apparatus of claim 3 wherein the concentration of the rinsing compound is in a range of from about 1 to about 30 g/L.

5. The apparatus of claim 1 comprising parallel lines leading from a main feeder line to said diluate and concentrate compartments of at least one of the electrodialysis units.

6. The apparatus of claim 1 comprising a closed loop line for passing the electrolyte through the diluate compartments of the electrodialysis units.

7. The apparatus of claim 5 comprising a closed loop line for passing the electrolyte through the diluate compartments of the electrodialysis units.

8. The apparatus of claim 6 comprising a collecting tank in the closed loop line for the electrolyte.

9. The apparatus of claim 6 comprising at least one heat exchanger in the closed loop line.

10. The apparatus of claim 6 comprising at least one filter through which the bath electrolyte passes.

11. The apparatus of claim 1 comprising a closed loop line for passing the regeneration electrolyte through the concentrate compartments of the electrodialysis units.

12. The apparatus of claim 11 comprising a collecting tank in the line system through which the regeneration electrolyte passes.

13. The apparatus of claim 6 comprising a closed loop line for passing the regeneration electrolyte through the concentrate compartments of the electrodialysis unit.

14. The apparatus of claim 1 comprising a closed loop system for channeling the rinsing electrolyte through the electrode compartments.

15. The apparatus of claim 6 comprising a closed loop system for channeling the rinsing electrolyte through the electrode compartments.

16. The apparatus of claim 11 comprising a closed loop system for channeling the rinsing electrolyte through the electrode compartments.

17. The apparatus of claim 13 comprising a closed loop system for channeling the rinsing electrolyte through the electrode compartments.

18. An apparatus for the electrodialytic regeneration of an electroless bath electrolyte comprising:

5 a first electrodialysis unit and a second electrodialysis unit, each unit having diluate compartments through which the bath electrolyte is channeled, and concentrate compartments through which a regeneration electrolyte is channeled;

two electrodes, comprising an anode and a cathode, in joint operation with said electrodialysis units;

10 wherein in the first electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent cations and on an anode side by membranes that are selectively permeable to all  
15 anions;

wherein in the second electrodialysis unit the diluate compartments are separated from the concentrate compartments on a cathode side by membranes that are selectively permeable to monovalent anions and on an anode  
20 side by membranes that are selectively permeable to all

cations;

wherein the diluate compartments of the first  
 electrodialysis unit are serially connected to the diluate  
 compartments of the second electrodialysis unit via first  
 lines through which the bath electrolyte is sequentially  
 25      channeled;

wherein the concentrate compartments of the first  
 electrodialysis unit are serially connected to the  
 concentrate compartments of the second electrodialysis unit  
 30      via second lines through which the regeneration electrolyte  
 is sequentially channeled;

wherein the electrodes are in electrode compartments  
 which are separated from adjacent compartments by membranes  
 and through which electrode compartments a rinsing  
 35      electrolyte can flow via third lines;

wherein one of said electrode compartments adjacent  
 to the compartments of both electrodialysis units houses an  
 electrode which is shared by both the first and second  
 electrodialysis units;

40      a closed loop system for channeling the rinsing  
 electrolyte through the electrode compartments;

a closed loop line for passing the regeneration  
 electrolyte through the concentrate compartments of the  
 electrodialysis units; and

45      a closed loop line for passing the electrolyte  
 through the diluate compartments of the electrodialysis  
 units.

SYSTEM FOR THE ELECTRODIALYTIC REGENERATION  
OF AN ELECTROLESS BATH ELECTROLYTE

Abstract of the Disclosure:

5       An apparatus for the electrodialytic regeneration of  
an electroless bath electrolyte. There are first and  
second electrodialysis having diluate compartments through  
which the bath electrolyte is channeled, concentrate  
compartments through which a regeneration electrolyte is  
10       channeled, and an anode and a cathode. In the first  
electrodialysis unit the diluate compartments are separated  
from the concentrate compartments on a cathode side by  
membranes that are selectively permeable to monovalent  
cations and on an anode side by membranes that are  
15       selectively permeable to all anions. In the second  
electrodialysis unit the diluate compartments are separated  
from the concentrate compartments on a cathode side by  
membranes that are selectively permeable to monovalent  
anions and on an anode side by membranes that are  
20       selectively permeable to all cations. The diluate  
compartments of the first electrodialysis unit are serially  
connected to the diluate compartments of the second  
electrodialysis unit via first lines through which the bath  
electrolyte is sequentially channeled. The concentrate  
25       compartments of the first electrodialysis unit are serially  
connected to the concentrate compartments of the second  
electrodialysis unit via second lines through which the  
regeneration electrolyte is sequentially channeled. The  
electrodes are in electrode compartments which are  
30       separated from adjacent compartments by membranes and  
through which electrode compartments a rinsing electrolyte  
can flow via third lines. One of the electrode